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# *Interactive comment on* "Spatiotemporal dynamics of soil phosphorus and crop uptake in global cropland during the twentieth century" *by* Jie Zhang et al.

**Anonymous Referee #1**

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This manuscript studied the spatial spatiotemporal dynamics of soil phosphorus and crop uptake in global cropland by using a simple mass balance model. Highlights of this paper is the large spatial scale and long temporal scale. However, there are some problems in this paper that should be carefully reconsidered by authors. 1) There exists temporal scale gap between crop uptake to phosphorus and the simulated results from this model. The time that crop uptakes phosphorus is in several months but the temporal scale from the model is ten years (one century but ten years step). In other words, the simple mass balance model used in this paper was not fully demonstrated in calculating the phosphorus untaken by crop. And this should be explained in the introduction. 2) About model's construction and veracity. This is a simple model that is



based on mass balance. It is important to study about the soil P cycle and plant cycle. The model fails to consider external phosphorus input from other land-use types like forest land or grass land when these types were converted to cropland. 3) There should have more words to explain the part about soil P loss and how to calculate this part in this paper. Soil P loss is a key role in the entire phosphorus cycle. 4) Something about the improvement about the original model. The improvement on the original model is not clear. In my opinion, the authors just changed the input data at world scale into country scale. If not, please describe them and tell readers what your innovation in detail is. 5) Precipitation and temperature are two key parameters in phosphorus cycle, and these two parameters have significant influences on the transformation between the two phosphorus pools. 6) There are many crop types in this world, and their capacity to uptake phosphors are very different. Please address this problem in detail. 7) There are many driving factors changing the spatial spatiotemporal dynamics of soil phosphorus and crop uptake in global cropland, like changing landuse and increasing input of artificial phosphorus. These factors should be discussed and the most key factors should be identified. 8) The equation 7 is not easily understood by the readers. Please clarify it. 9) There are many similar researches at the world scale and many researches have more longer temporal scale than this paper? So, please clearly clarify the innovation points of this paper.

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